

Appl. No. 10/630,079

Amdt. Dated July 16, 2004

Reply to Office Action mailed June 28, 2004

### AMENDMENTS TO THE CLAIMS

1. (Original) A system for detecting underwater buried objects comprising:  
an acoustical camera adapted to produce three dimensional volumetric images of an underwater target area volume of an underwater floor;  
an acoustic transducer adapted to apply an acoustic pulse to the target area volume so as to cause displacement of materials included in the target area volume; and  
a controller adapted to coordinate operation of the camera and the acoustic transducer, wherein a first volumetric image of the target area volume is produced before the acoustic pulse is applied, and a second volumetric image of the target area volume is produced while the acoustic pulse is present in the target area volume.
2. (Original) The system of claim 1 wherein the camera produces volumetric images of the underwater target area volume at a real-time frame rate.
3. (Original) The system of claim 1 wherein the camera is further adapted to operate in an interferometer mode having a resolution of less than one wavelength.
4. (Original) The system of claim 1 wherein the controller is further adapted to compare volumetric images for evidence of at least one of a partially or completely buried object.
5. (Original) The system of claim 4 wherein the evidence of buried objects is based on movement of floor materials relative to the buried objects.
6. (Original) The system of claim 1 further comprising:  
an image recorder adapted to record the volumetric images.
7. (Original) The system of claim 1 wherein the acoustical transducer is extendible towards the target area volume.
8. (Original) The system of claim 1 further comprising:

Appl. No. 10/630,079

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an image discrimination module adapted to discriminate interesting objects from non-interesting objects detected in the volumetric images.

9. (Original) The system of claim 1 further comprising:

a range finder adapted to detect when the system is at a proper distance from the target area volume for imaging purposes.

10. (Original) The system of claim 1 wherein the camera is configured for producing volumetric images within a 16 feet range at a frame rate greater than 10 frames/second, the camera having an acoustical lens configured for forming images on an array of acoustical transducer elements.

11. (Original) A system for detecting underwater buried objects comprising:

an acoustical camera adapted to produce three dimensional volumetric images of an underwater target area volume of an underwater floor;

an acoustic transducer adapted to apply an acoustic pulse to the target area volume so as to cause displacement of materials included in the target area volume; and

a controller adapted to coordinate operation of the camera and the acoustic transducer, so that a volumetric image of the target area volume is produced while the acoustic pulse is present in the target area volume, thereby allowing buried objects to be detected based on relative movements in the target volume area.

12. (Original) The system of claim 11 wherein the camera is further adapted to operate as an acoustical imaging interferometer having a resolution of less than one wavelength.

13. (Original) A method for detecting underwater buried objects comprising:

producing one or more three dimensional volumetric images of an underwater target area volume of an underwater floor;

applying an acoustic pulse to the target area volume so as to cause displacement of materials included in the target area volume; and

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producing one or more second volumetric images of the target area volume while the acoustic pulse is present in the target area volume.

14. (Original) The method of claim 13 wherein producing volumetric images of the underwater target area volume is performed at a real-time frame rate.

15. (Original) The method of claim 13 wherein producing volumetric images of the underwater target area volume is performed using a resolution of less than one wavelength.

16. (Original) The method of claim 13, further comprising:  
comparing volumetric images for evidence of at least one of a partially or completely buried object.

17. (Original) The method of claim 16 wherein comparing volumetric images for evidence of buried objects includes detecting movement of floor materials relative to the buried objects.

18. (Original) The method of claim 13 further comprising:  
recording the volumetric images.

19. (Original) The method of claim 13 further comprising:  
discriminating interesting objects from non-interesting objects detected in the volumetric images.

20. (Original) The method of claim 13 further comprising:  
detecting a proper distance from the target area volume for imaging purposes.